How To Define Processes in Expert Mode

NDIA 2003 Systems Engineering Conference

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“I have made this letter longer than usual because I lack the time to make it shorter”

Blaise Pascal

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Presentation Objectives

Describe common problems with process documentation.

Discuss some people aspects of using process documentation.

Provide motivation for defining short and usable processes.

Provide some “expert mode” examples.

Provide some lessons learned of “what works” and “what doesn’t work”.

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Outline

Common Process Documentation Problems

Some People Aspects of Using Process

Why Use Expert Mode?

Some Principles of Process Definition

What is Expert Mode?

Expert Mode Examples

Some Lessons Learned

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Common Process Problems

Too Big: Processes become "Big Honkin' Binders".

Poor Usability: Not "fit for use" by process users. Many processes contain mixed information types.

Poor Design: Process documentation usually violates good definition and writing principles.

Lack of Pictures: Processes need to be defined by well thought out diagrams or models.

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Some People Aspects

People Perform Processes: People process information using human behaviors (e.g., cognitive psychology), and people are not always logical.

Chunking: Information should grouped into small, manageable units (e.g., 7 plus or minus 2 chunks).

Labeling: A label should be used for each "chunk" of information (people like to find things quickly).

Hierarchy: Small, relevant units of information should be organized into a hierarchy and labeled.

- Adapted from " Developing Procedures Policies and Documentation" Training, IMI

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People Aspects, Continued

Relevance: All the information in one chunk should relate to one main point based on that information's purpose and function for the user.

Level of Detail: Information should be written at a level of detail that meets the users needs, and provides accessibility to more detail if the user needs it.

Consistency: Wording should be used consistently for similar subject matters, labels, formatting, etc.

Integrated Graphics: Diagrams, tables, models, etc., should be used as an integral part of the text.

- **Adapted from " Developing Procedures Policies and Documentation" Training, IMI**

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Why Process Definition?

Improves Productivity: Defined processes can help dramatically improve productivity (e.g., process improvement efforts have doubled productivity).

Saves Time and Money: Users can dramatically reduce their effort (e.g., cut cycle time in half).

Reduces Defects: Defined processes help reduce and prevent defects (e.g., cut rework in half and reduce defects by a factor of 10).

Improves Documentation: Definition is

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Why Expert Mode?

Reduces Size: **Expert mode dramatically reduces size (e.g., cut 100 pages to 30 pages).**

Better Usability: **Expert mode requires speaking to the "experts", and defining what "chunks" they use.**

Better Designs: **Expert mode requires good process definition and writing principles.**

Use of Pictures: **Processes need to be defined by well thought out diagrams or "process models".**

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Why Expert Mode?

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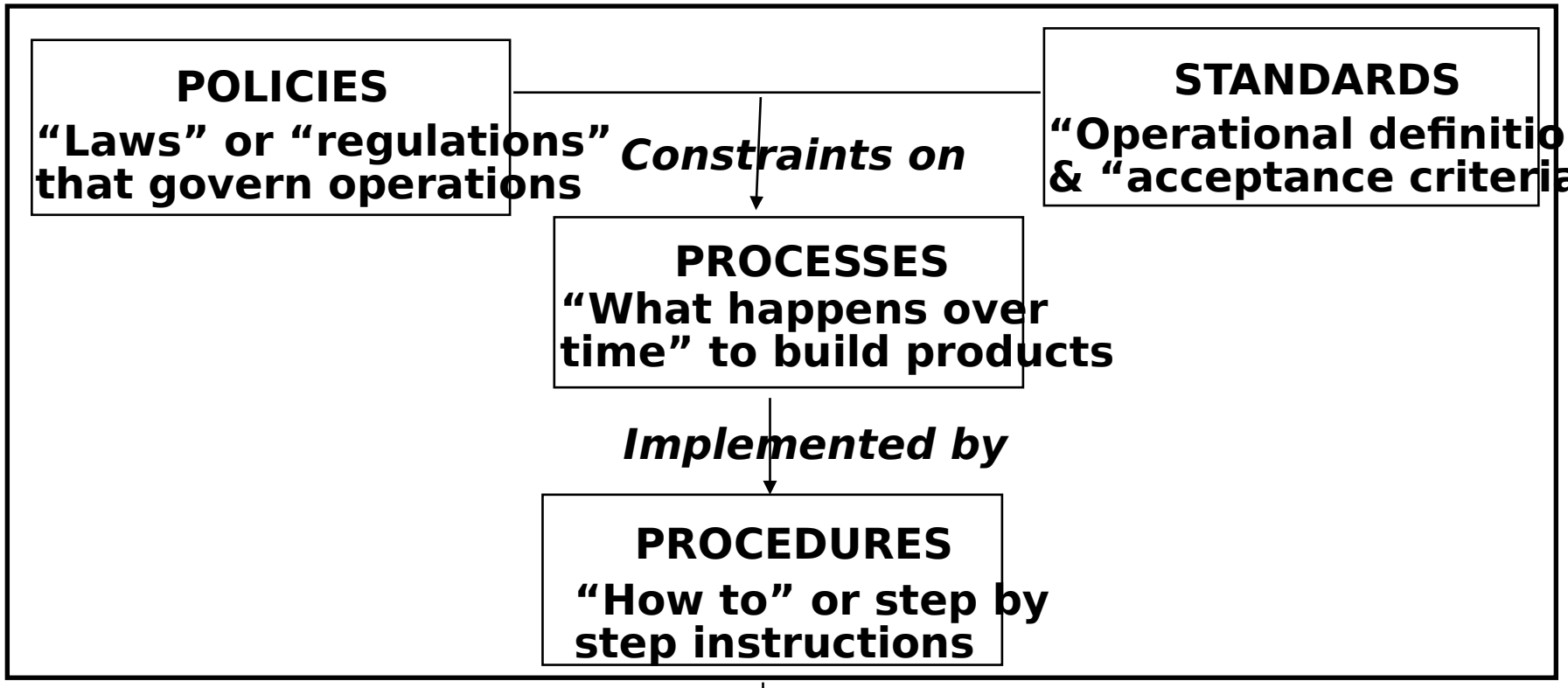
SEI Operational Framework



• Slide adapted from”A Software Process Framework for the SEI Capability Maturity Model”, CMU/SEI-94-HB-

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Key Process Questions

Key Process Question	Process Element
Why is the activity performed?	1. Purpose
Who does what activity?	2. Activity performed by role(s)
What work products are used?	3. Input(s)
What work products are produced?	4. Output(s)
When does the activity begin?	5. Entry criteria
When does the activity end?	6. Exit criteria
How is the activity implemented?	7. Sub-Activity, procedure, method
What activity is next?	8. Flow (e.g., sequence, selection)
Where is activity performed?	9. Context (e.g., hierarchy)

- Slide adapted from”A Software Process Framework for the SEI Capability Maturity Model”, CMU/SEI-94-H

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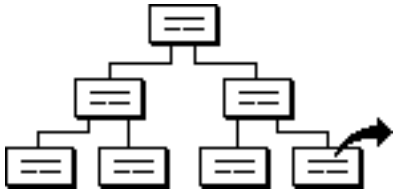
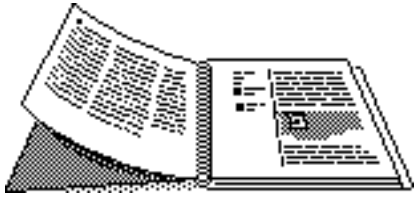
“Pictures” and “Words”



Pictures

Pictures

- Pictures are worth a 1000 words, and some people are visually oriented
- Organizations have reached SEI CMM Level 3 with pictures and words
- Pictures can be formalized into models
- Models are a graphical representation for analyzing entities and their relationships, e.g., data flow, work flow, dependencies, etc.
- Pictures are necessary, but not sufficient



Words

Words

- Words fill in the needed details that pictures or models miss
- Some people are textually oriented
- Words are necessary, but not sufficient

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What is Expert Mode?

"Make three correct guesses consecutively and you will establish a reputation as an expert." (Lawrence Peter)

Expert: "possessing special skill or knowledge; trained by practice; skillful or skilled." (Websters)

"Expert Mode" is defining processes that:

- **are as concise and precise as possible**
- **are at an appropriate level of detail for an expert**
- **are "chunked" so that an expert will use them**
- **use process models, checklists, forms, and tables**
- **are free from training material**

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Process Definition Modes

Beginner Mode:
- Assumes user has little or no experience
- Includes training material
- Includes process guidance and lessons learned

Intermediate Mode:
- Assumes user has some experience with process
- Includes process guidance and lessons learned

Expert Mode:
- Assumes user is very experienced
- Concise and precise as possible

All Modes should be "Chunked" and Include:
- Process models, checklists, forms, and

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Some Expert Mode Examples

Process Diagrams

Process Models

When/Then Tables

Checklists

Step/Action Tables

Forms

Process Guides

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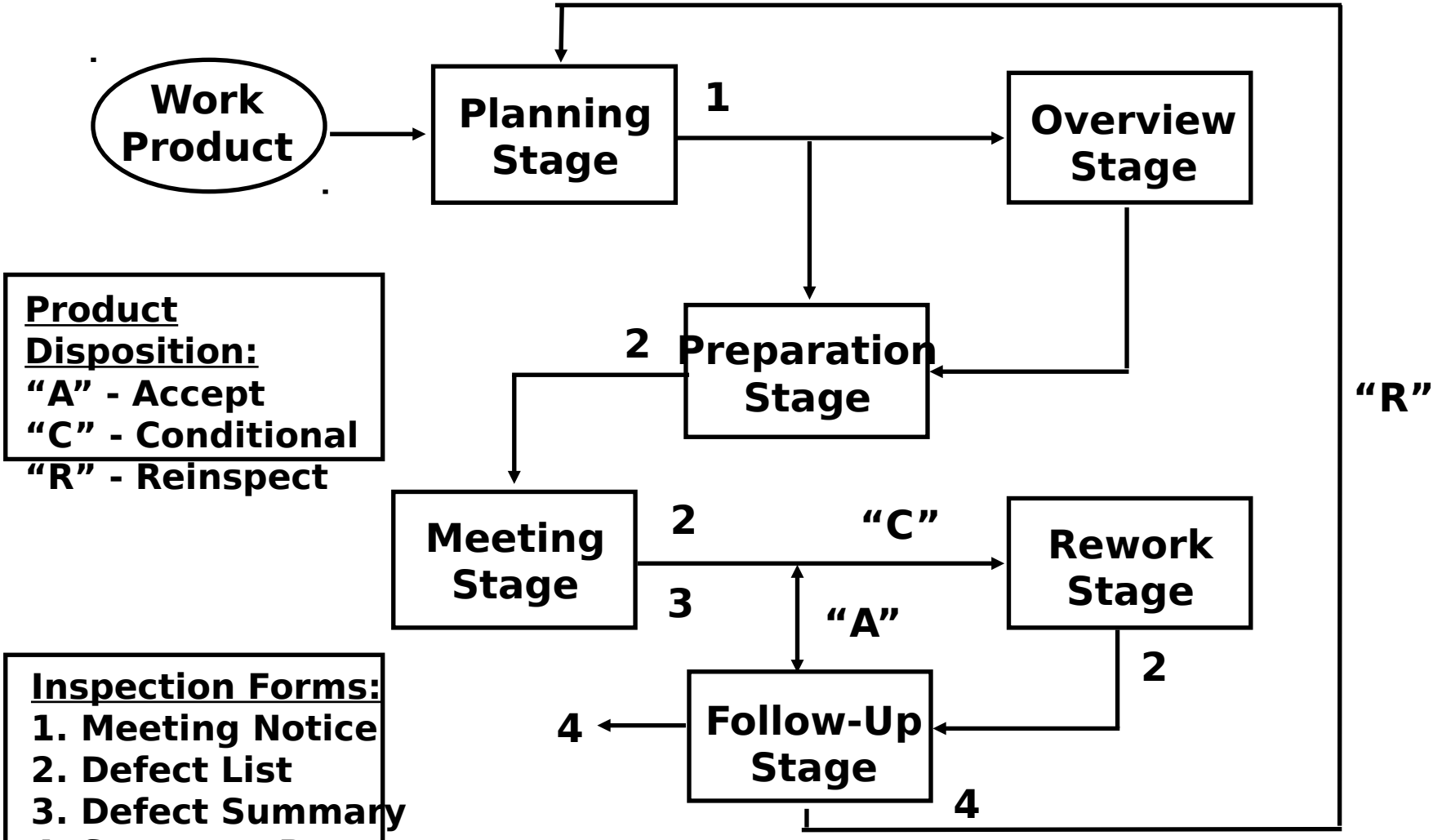
Inspection Process Model



•Adapted from Ebenau, *Software Inspection Process*, McGraw Hill, 1994

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Planning Stage

Purpose: Organize and plan resources for inspection

Inputs	Entry	Task	eXit	Outputs
• Final Draft of work product • Supporting materials for work product • Inspection entry criteria • Inspection data (estimated or actual)	• Work product is completed (Final Draft) & • Work product meets entry criteria XOR • Re-inspection	1. Verify entry criteria 2. Select inspection team 3. Need an overview? 4. Schedule inspection 5. Complete and distribute inspection work package **Measurements** • Preparation rate • Inspection rate • Defect density	• Verified entry criteria & • Inspection work package completed & distributed & • <Overview scheduled>	• Inspection work package

Role: Moderator; Author

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Overview Decision Table

When...	Then...
• The work product is large, or complex, or interrelates extensively with other work products. • The work product represents a use of technology that is new or infrequently used by the other inspectors. • The work product is critical to the project, and sets direction for subsequent work. • There is a division of technical responsibility among the inspectors, with a sharing of the role of reader because of differences in inspector expertise.	Schedule an Overview Meeting
• The inspectors are already familiar with the work product	Skip the Overview Stage, and proceed to the Preparation Stage

• **Reference: " World-Class Software Inspection Process Guide", by Olson, Timothy G., 19**

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Example Checklist Questions

General Code Checklist:

- **Completeness: Does the code implement the design and the requirements?**
- **Traceability: Does the code trace back to the design and the requirements?**
- **Interfaces: Are the software interfaces correct? Are the interfaces to Hardware correct?**

C Language Example:

- **"=" Misuse: Any incorrect usage of "=" and "=="?**

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Example Step/Action Table

Preparation Procedure for Inspector Role	
Step	**Action**
1	Inspector tracks his or her time while examining work product for defects.
2	Inspector uses the appropriate defect checklist to examine the work product for defects for the estimated time on the inspection meeting notice.
3	Inspector records defects on the Defect List according to the defect classification scheme.
4	Continue steps 1-3 until work product is completely inspected (record prep. time).

Reference "World Class Software Inspection Process Guide", by Olson, Timothy G., 1994

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Forms

Forms are procedures (i.e., “how to”, step by step information) to support and implement processes.

<u>Example Inspection Forms</u>:

- **Meeting Notice**
- **Defect List**
- **Defect Summary**
- **Meeting Summary**

<u>Forms should be</u>:

- **for one (or more) people to complete a repeatable activity**
- **hard-copy, automated, or both.**
- **instrumented in order to collect data.**

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Example Defect List Form

Software Inspection Defect List

Page _____ of _____

Project:	_____	**Meeting Date:**	_____
Phase:	_____	**Release:**	_____
Component:	_____	**Document:**	_____
Preparation Time:	_____	**Inspector:**	_____

#	Location				Defect Description	Defect			Rwk Tm *
	Pg	Sec	Para	Sen		Type	Class	Sev	

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- **Reference: " World-Class Software Inspection Process Guide", by Olson, Timothy G., 1994**

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Process Guide Example

Stage 1: Planning

Section Overview

Purpose The purpose of the planning stage is to schedule and organize the software inspection, select the inspection team and roles, and ensure checklist coverage. The quality of an inspection is greatly influenced by effective planning.

Active Roles The author and moderator have tasks that they must perform during this stage.

In This Section The following table identifies where to find the planning subsections:

Planning Stage Subsections	See Page
Planning Stage Process Model	Plan-2
Inspection Work Package Checklist	Plan-2
Entry Criteria Checklist for the Planning Stage	Plan-3
Author Planning Procedure	Plan-4
Moderator Planning Procedure	Plan-4
Selecting the Inspectors and Determining Roles	Plan-5

Example of a Process Guide Section for the Inspection Planning Stage

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Some Lessons Learned - 1

The SEI Operational Framework helps organize your process documents.

Model based process guides are much more organized, precise, concise, and defect free.

Use a proven process to define your processes.

Applying process definition, process modeling, and Information Mapping® principles greatly enhances usability.

Other “modes” such as beginner and intermediate can also be added (e.g., to an

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Some Lessons Learned - 2

Process models will drive the structure of a process guide.

Information Mapping® is a helpful approach for writing procedures, and documenting process guides.

Make sure to address the people issues of process documentation.

No matter what you do, some people will always hate your processes and procedures.

Use “expert mode” to keep your documents short (e.g., process models, checklists, tables, etc).

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